Late-Quaternary transgressive erosion and deposition in the Adriatic epicontinental Basin

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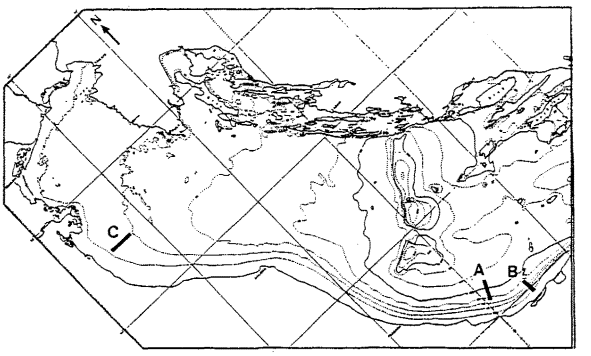
The study of modern continental margins provides several examples of transgressive erosion and deposition that originated during a short time span of increasing accommodation, and/or decreasing sediment supply, driven by the post-18-ky eustatic rise of sealevel. When detectable on seismic profiles the TST is defined as a succession of backstepping or retrogradational parasequences ; it rests on a transgressive surface marking the first major flood of the previous LST. The top of the TST is the surface of maximum flooding above which the parasequence stacking pattern is progradational. Low sediment supply and/or extensive erosional processes during relative sealevel rise can determine the lack of deposition or preservation of the TST. High-resolution reflection seismic profiles document the variability of thickness, internal organization and position in time of the transgressive systems tract that originated during the post-18-ky relative sea level rise within two distinct portions of the Adriatic epicontinental basin.

The Adriatic sea is an elongated and narrow (800 X 200 km) epicontinental basin consisting of a wide and gentle shelf to the north, the Mesoadriatic Depression, below a 140 m deep shelf-break, and a more complex ramp area to the south (Fig. 1). The shelf area located south of the Mesoadriatic Depression corresponds to the Apulian foreland ramp. During the late-Quaternary relative sealevel fall and lowstand a prograding wedge resulted from a process of "forced regression" and is capped by a transgressive erosional surface. A stack of onlapping (backstepping) marine wedges lying above the Transgressive surface is observed in areas where high sediment input counteracts the late stages of relative sealevel rise. In this case the Transgressive surface is markedly erosional with a plurimetric relief likely shaped by shoreface retreat as well as marine processes. No indication of paralic deposits is observed within the TST in this case ; as a consequence, the ravinement surface coincides with the transgressive surface (Fig. 2A). In areas of higher sediment supply, washover deposits can be preserved ; they downlap onto backbarrier deposits that show an aggradational backstepping configuration (Fig. 2B). Above the backbarrier transgressive deposits, a thin wedge or drape of shelf sediment can be detected; it belongs to the TST and is floored by the Ravinement surface and capped by the maximum flooding surface.

Fig. 1: Schematic bathymetric map of the Adriatic epicontinental basin.



The northern Adriatic area encompasses the Apennine foredeep and foreland basin filled by Plio-Quaternary progradational deposits with no evidence of aggradation . During the late-Quaternary lowstand this area underwent extensive subaerial erosion followed by the deposition of a lowstand wedge on the northern edge of the Mesoadriatic Depression. Seismic correlation proves that progradation from the north (fed by the Po river and tributaries) encompassed the early stages of relative sealevel rise (likely before R inflection point) while the southern area was experiencing erosional retreat and ensuing flooding of the shelf. Transgressive deposition in the Northern area is dominated by barrier island complexes and delta front bars (Fig. 2C). Tidal inlets and fluvial distributary channels appear as shallow (typically a few metres deep) erosional features that extend on short distances; they differ thus from the deeper and more continuous fluvial systems, entrenched during relative sealevel fall and lowstand, that are preserved in outer-shelf areas. Deposits appear sandier compared to the manne transgressive parasequences observed in the southern area. The Ravinement surface can be distinguished from the transgressive surface (TS) at the base of the TST, but is coincident with the maximum flooding surface (MF), because of the lack of detectable marine transgressive deposits, and, at places, with the sea floor, because of the lack of highstand deposition.

When imaged by means of high-resolution reflection seismic profiling, using broad-band sound sources, the stratigraphic record of the late-Quaternary transgressive deposits of the Adriatic epicontinental basin appears punctuated by several closely-spaced flooding surfaces that separate parasequences (i.e.: relatively conformable shoaling upward succession of genetically-related beds). Sediment supply, oceanographic setting and regional gradient control whether the facies that characterize the transgressive deposits are dominantly paralic. dominantly marine or both.

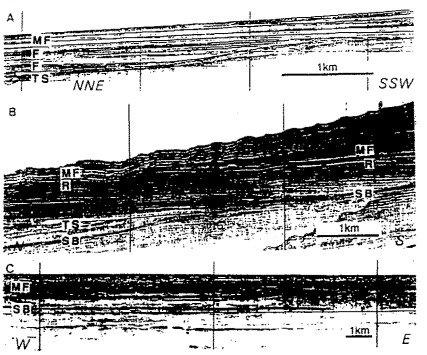


Fig. 2 : Examples of late-Quaternary transgressive deposits in the Adriatic epicontinental basin. A : Backstepping parasequences consisting of marine deposits bounded by flooding surfaces (F). Note coincidence of Transgressive surface and Ravinement surface (TS). MF is maximum flooding surface.
B : Land-ward dipping washover deposits downlapping onto backbarrier transgressive facies. Note the thin wedge of shelf transgressive deposit between the Ravinement surface (R) and the maximum flooding surface (MF). TS : transgressive surface; SB : sequence boundary. C: Transgressive parasequences underneath the HSST prodelta wedge; note the shallow distributary channels in delta-front deposits.